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*MICROSCOPIC SCIENCE.*<sup>1</sup>

PROF. T. G. WORMLEY delivered no formal address. He gave only a short discourse, in which he described the advantages and possibilities of two special applications of the microscope: first, to the detection of very minute quantities of certain poisons, notably arsenic, by the examination of the sublimate; second, to the examination of blood stains. He described the limits within which identification of different animals, and the recognition of human blood, is feasible; he denied that human blood can be absolutely identified; he also stated that the result of prolonged experiments indicated that pure water is the best reagent for restoring the blood-corpuscles in a stain to their natural condition.

*MAN IN THE TERTIARIES.*<sup>2</sup>

IN studying the questions of his own origin and antiquity, man has been hindered by many prejudices and by many barriers of his own erection, the first and most formidable of which was the theological barrier of the Mosaic cosmogony. In process of time this was partially removed; but other barriers to free investigation arose, founded on the evidence collected by the very men who had done most to destroy the earlier obstacles. Cuvier declared that man, being the last and highest of creation, could never have been contemporary with the extinct species of mammals found in the quaternary beds. For a time all evidence to the contrary was treated with contempt; but Cuvier's massive authority was finally overthrown by Perthes, Schmerling, and others.

No sooner had the Cuvierian barrier against quaternary man been demolished, than smaller barriers of precisely the same nature were erected against the tertiaries. Gaudry could not admit that the worked flints discovered by the Abbé Bourgeois in the miocene of Thenay were the remains of men; because he found it difficult to believe, that, while every other species of the miocene is now extinct, man alone should have remained unchanged. Professor Dawkins in a similar line of argument assumes that man cannot be looked for until the lower animals now in existence made their appearance. In the eocene age there were none of the present living genera of placental mammals, in the miocene none of the present living species; and it is most unlikely that man should appear at such a time. At this period the apes (*Simiadae*) haunting the forests of Europe were the most highly organized types. Moreover, if man were upon the earth in the miocene age, it is incredible that he should not have become something else during those long ages in the course of which all the

miocene land mammalia have either assumed new forms or been exterminated. And for similar reasons Professor Dawkins says he cannot expect to find traces of man in the pliocene. But such assumptions are obstructive: they not only put a check upon research, but they prevent the unbiased consideration of fresh evidence.

These theories have been greatly strengthened by the idea that man has been evolved from the higher apes, and that his nearest relations among these creatures are those which are supposed to have appeared last in the sequence. Nevertheless, we find the evidences of man associated with extinct apes, and the gap between them is by no means closed in these earlier horizons. In the earliest remains of man thus far recognized, we do not have the most pronounced ape-like features, as we should have a right to expect if both have sprung from the same stem, and if man is limited to the quaternaries. All these forms are still man, with a fair brain-case; though the slight modifications toward an ape-like structure have the deepest significance in clearly indicating the direction from which he sprang.

If paleontologists are right, the first anthropoid apes have been found in the middle eocene, and later still a more generalized form called *Oreopithecus*; and side by side with these are found chipped flints if we are to accept the authority of their discoverer Bourgeois and the opinion of Mortillet and others. If man existed then, — and on theoretical grounds there is no reason to believe that he did not exist, — we must look much farther back for the approach of these two groups.

The earliest evidences of man must be sought in his remains, and not in his works; but the very conditions of life which characterized early man and his associates render the preservation of their remains a matter of extreme improbability. The herbivora in herds, seeking the shelter of watery places, would in dying become mired, and thus preserved in a matrix for the future explorer. Aquatic forms are infinitely more abundant as fossils than land or aerial forms, — water-birds than land-birds. The arboreal ancestors of man, and the probable habits of man himself, would leave their bones to bleach in the field or forest, to decompose and disappear long before an entombment was possible. It was only when man acquired the art of sepulture, or sought refuge in caves, that the preservation of his remains became assured. Surface changes, however, have been so wide-spread and profound as to nearly obliterate all trace of these places, and when preserved the harvest from them has been of the most meagre description. Of nearly fifty caves examined by Schmerling in Belgium, only two or three contained human remains. Lund, who examined eight hundred caves in Brazil, found only six containing human remains. The grain of the Swiss lake-dwellers, and even the bread they made, have been preserved; but human bones are of scanty occurrence. The Danish peat-beds have as yet yielded none, though stone implements and other objects are found there in abundance.

Chief among the agencies in destroying the evi-

<sup>1</sup> Abstract of an address before the section of histology and microscopy of the American association for the advancement of science, at Philadelphia, Sept. 4, by Prof. T. G. WORMLEY of the University of Pennsylvania, vice-president of the section.

<sup>2</sup> Abstract of an address to the section of anthropology of the American association for the advancement of science, at Philadelphia, Sept. 4, by Dr. EDWARD S. MORSE, of the Peabody academy of science, Salem, Mass., vice-president of the section.